Geophysical Research Abstracts
Vol. 16, EGU2014-14717, 2014
EGU General Assembly 2014


# Soil biological activity at European scale – two calculation concepts

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The CATCH-C project aims to identify and improve the farm-compatibility of Soil Management Practices including to promote productivity, climate change mitigation and soil quality. The focus of this work concentrates on turnover conditions for soil organic matter (SOM). SOM is fundamental for the maintenance of quality and functions of soils while SOM storage is attributed a great importance in terms of climate change mitigation. The turnover conditions depend on soil biological activity characterized by climate and soil properties.

To assess the turnover conditions two model concepts are applied:
(I) Biological active time (BAT) regression approach derived from CANDY model (Franko & Oelschlägel 1995) expresses the variation of air temperature, precipitation and soil texture as a timescale and an indicator of biological activity for soil organic matter (SOM) turnover.
(II) Re_clim parameter within the Introductory Carbon Balance Model (Andrén & Kätterer 1997) states the soil temperature and soil water to estimate soil biological activity.

The modelling includes two strategies to cover the European scale and conditions.
BAT was calculated on a 20x20 km grid basis. The European data sets of precipitation and air temperature (time period 1901-2000, monthly resolution), (Mitchell et al. 2004) were used to derive long-term averages. As we focus on agricultural areas we included CORINE data (2006) to extract arable land. The resulting BATs under co-consideration of the main soil textures (clay, silt, sand and loam) were investigated per environmental zone (ENZs, Metzger et al. 2005) that represents similar conditions for precipitation, temperature and relief to identify BAT ranges and hence turnover conditions for each ENZ.
Re_clim was quantified by climatic time series of more than 250 weather stations across Europe presented by Klein Tank et al. (2002). Daily temperature, precipitation and potential evapotranspiration (maximal thermal extent) were used to calculate soil temperature and water storage in the arable layer thereby differentiating soil textures exclusively in main types (clay, silt, sand and loam). Similar to the BAT investigation it was of further interest to investigate how the re_clim parameter range behaves per ENZ.

We will discuss the analyzed results of both strategies in a comparative manner to assess SOM turnover conditions across Europe. Both concepts help to separate different turnover activities and to indicate organic matter input in order to maintain the given SOM. The assessment could provide local recommendations for local adaptations of soil management practices.

CATCH-C is funded within the 7th Framework Programme for Research, Technological Development and Demonstration, Theme 2 – Biotechnologies, Agriculture & Food (Grant Agreement N° 289782).